PATENT SPECIFICATION

1,008,703

Inventor: REGINALD JOHNSON.

Date of filing Complete Specification: July 24, 1964.

Application Date: July 29, 1963. No. 29920/63

Complete Specification Published: November 3, 1965.

Index at Acceptance:—D2 A (7A2, 7B5, 7B6, 7B23, 7BX6); B8 C (15B, 15C, 30); B8 K2M; D2 B (11B, 13J1, 30).

Int. Cl.:—D 21 f // B65b, d, D21h.

COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in or relating to a Method of Manufacturing a Fibrous Web

We, JAMES R. CROMPTON AND BROTHERS LIMITED, a British Company, of Elton Paper Mills, Bury, Lancashire, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a method of manufacturing a fibrous web.

It has previously been proposed to manufacture fibrous webs, e.g. of paper, by laying down the web from a fluid suspension which is applied to a travelling wire or cloth screen. The suspending fluid, which can be liquid or gaseous, drains through the screen leaving behind web-forming fibres which are subsequently removed from the wire as a continuous web.

An object of the present invention is to provide means whereby the fibres forming a web can be deposited according to a given pattern.

According to the present invention, there is provided a method of manufacturing a fibrous web comprising applying a suspension of fibres in a fluid on to a supporting screen, said screen being provided with means for restricting fluid drainage through the screen according to a given pattern whereby a fibrous web is laid down on the screen in accordance with said pattern, said drainage restricting means not extending substantially beyond the upper surface of the screen.

In the manufacture of paper for use in making tea bags, it has previously been the practice to apply a fluid suspension of fibres on to a travelling wire screen to form an air-permeable paper web. The paper web thus formed is then coated with a further layer of fibres comprising wholly or mainly a heat sealable material, the heat sealing fibres being distributed substantially uniformly over the paper web. It will be apparent that by using the above process an excess of heat-sealing fibres are used and this has two distinct disadvantages. Firstly, the fact that the heat sealing fibres are distributed uniformly over the whole of the paper web instead of merely at those locations where heat sealing is required means that an unnecessary amount of heat sealing fibres is being used. Secondly, again due to the uniform distribution of the heat sealing fibres over the paper web, the air permeability and fusion rate of those portions of a tea bag which are not to be heat sealed is decreased.

Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings in which:—

Figure 1 is a diagramatic representation of one form of apparatus for carrying out the present invention,

Figure 2 is a fragmentary view to an enlarged scale of a wire screen suitable for producing tea bag paper.

Figure 3 is a fragmentary view of a tea bag paper produced in accordance with the method of the invention,

Figure 4 is a fragmentary view of another form of paper produced by the present invention, and

Figure 5 is a diagramatic representation of an alternative form of apparatus for carrying out the present invention.

In the method according to the present invention and with particular reference to Figures 1 to 3, the heat sealing tea bag paper is made according to accepted practice except that the normal type of travelling wire screen is replaced by one in the form of an open mesh wire web 6 of which discontinuous areas 7 (Figure 2) are blanked

[Pr]

off by means of coating them with hardened gelatin. The screen 6 is driven through drive rolls 8, 9 and travels over guide rolls 10, 11, 12 and 13. The blanked off areas 7 are of square form and 7 to the inch and are separated from each other by peripheral open mesh areas 14 1/32" wide.

When the suspension of base paper fibres 15, held in a reservoir 16 is fed on to the screen 6 the suspension fluid drains into a receptacle 17 through the wire screen 6 as at 18 only at the open mesh areas 14 and the fibres as shown in Figure 3 tend to be concentrated in the pattern of these areas but because of the relative length of these fibres 15, average about 3/16", a thin web nevertheless does extend over the whole screen surface. When the suspension 19 of heat-sealing fibres 20 (Figure 3) and attendant beaten paper-making fibres is added to the partially formed sheet from a head-box 21, according to accepted practice, then these much shorter fibres tend to be deposited almost exclusively over the open drainage areas 14 when the remainder of the suspension fluid drains through. The fibrous web thus formed is then drawn off the wire screen 6 and is then as shown in Figure 3 in the form of regular square areas substantially free of heat-sealing fibres 20 (shown in blacker lines in Figure 3), each area being surrounded by a peripheral area in which the heat sealing fibres 20 have been concentrated.

Using a wire screen of this particular design, the open areas 14 comprise 7/16 of the total area of the screen and consequently the heat sealing fibres 20 and the attendant short paper-making fibres will cover approximately ½ of the total area of the paper. The size and shape of blanked-off areas and peripheral 'clear' areas can of course be varied as desired.

The fact that approximately half of the area of the tea bag made with this paper is substantially free of heat-sealing fibres 20 and attendant short paper-making fibres ensures a greater air permeability in the uncovered areas and results in the use of less heat-sealing fibres than has previously been required. Both factors result in a tea bag when made according to the invention, having an improved infusion rate.

Although in the above described embodiment, the screen 6 is stated to be of wire and the blanked-off areas 7 are formed by coating the screen with gelatin, the screen 6 can be of any suitable material e.g. synthetic plastic and the blanked-off areas 7 can be obtained with materials other than gelatin e.g. thermoplastic or thermosetting synthetic plastic material or solder. Alternatively, the areas can be blanked-off by electrolytic deposition.

The present invention has been described above with specific reference to the manufacture of tea bags. It will be appreciated, however, that the method has much wider applications. For example, in a second embodiment of the invention described with particular reference to Figure 4 and in which heat sealing fibres are not employed, the screen is given any desired pattern by means of blanking-off discontinuous areas. Fibres 22 of a sufficiently short average length chosen to suit the pattern size and the extent of the gaps between blanked-off areas is then laid down in suspension on the screen. The fibres 22 are oriented along the gaps and when the web is drawn off the screen, a fibrous network as shown in Figure 4 of the desired pattern results. The design of the pattern governs the properties of the network produced as regards strength, stretch, drape and permeability.

If in the preceding embodiment, longer fibres are employed for the same given pattern of screen, the resultant fibrous web is in the nature of an interconnected network of ridges of relatively high substance i.e. wt/unit area, each mesh of the network being closed by a thinner fibrous membrane of relatively low substance. By this means a fibrous web is obtained in which for a given overall substance, the air-permeability is greatly increased whilst the strength relative to a uniform sheet of the same substance is approximately the same.

In a third embodiment of the present invention as described with reference to Figure 5, the pattern is not embodied in or superimposed on the screen. In this arrangement a uniform plain screen 23 is employed and there is brought into contact with the uniform screen 23 a second endless screen 24 having a patterned surface and being adapted to move in known fashion around a system of rollers 25. Drainage can take place through the screen 24 in accordance with the pattern. A fluid suspension 26 of base paper fibres is fed on to the uniform screen 23, the excess fluid draining through into a trough 27 located below the screen, the water being capable of being drawn off from the trough through an outlet valve 28. At a point subsequent to the laying on of the base paper fibres in relation to the path of travel of the screen 23, a second suspension of paper fibres is positioned in a head-box 29 above where the screens 23 and 24 approach one another closely. When the second suspension is fed as a second layer on the existing uniform layer carried by the screen 23, the second layer is patterned due to the patterned screen 24. In the same manner as in the preceding embodiments, the tendency is for the fibres of the second layer to be oriented mainly along the open areas of the pattern thus producing a correspondingly patterned fibrous web which

can be drawn off the uniform screen 23. The patterned surface although shown in Figure 5 as a continuous wire screen 24 can be in any other suitable form e.g. it can be a rubber or synthetic plastic belt, wire-covered roll, or a hollow or solid roll with an etched, cut or moulded pattern thereon, means always being provided for the removal of the fluid drainage from the open areas of the pattern. In this embodiment, the blocked out patterns can be continuous i.e. connected areas and the open areas separate. This arrangement permits the production of a fibrous web made up of a plurality of layers which can be effected by using multiple head-boxes and a combination of unrestricted and patterned drainage stages. Each of the several layers can be of the same composition or alternatively, individual layers can have special characteristics as desired, e.g. colour or heat sealing properties. Additional layers superimposed on the initial fibrous layer need not be fibrous e.g. they can be mineral pigments.

In the three embodiments of the invention described above the pattern on the screen is formed by taking a uniform screen and blanking off areas as desired. The screen can also be provided with a pattern in suitable cases, by weaving the wire or cloth to form a woven pattern so that areas of varying drainage rates are produced. In this way, a similar effect can be obtained even although certain areas are not completely blanked-off.

Any desired patterns can be reproduced in the screens of the above-described embodiments, although where only a single patterned screen is employed, the open areas must be continuous.

WHAT WE CLAIM IS:—

1. A method of manufacturing a fibrous web comprising applying a suspension of fibres in a fluid on to a supporting screen, said screen being provided with means for restricting fluid drainage through the screen according to a given pattern whereby a fibrous web is laid down on the screen in accordance with said pattern, said drainage restricting means not extending substantially beyond the upper surface of the screen.

2. A method as claimed in claim 1 in which the fibres are of paper-making fibres.

3. A method as claimed in claim 1 in which the screen comprises a wire web having discontinuous areas blanked-off to prevent drainage therethrough.

4. A method as claimed in claim 3, in which said discontinuous areas are blanked-off by coating them with gelatin.

5. A method as claimed in claim 1, comprising applying relatively long paper making fibres and relatively short fibres of a heat sealable material to the screen, the paper making fibres being of a length sufficient to form a continuous paper web on the screen while the shorter heat sealing fibres are of a length such that they are laid down predominantly along the continuous unrestricted areas of the screen.

6. A method as claimed in claim 5, comprising applying the paper-making fibres and the heat sealable fibres to the screen in separate operations.

7. A method as claimed in any of claims 1 to 3, comprising applying to the screen a layer of fibres of a length sufficiently short such that the fibres are concentrated entirely along the unrestricted areas of the screen to produce a web in the form of an open network.

8. A method as claimed in claim 5 or 6, comprising drying the web thus formed and forming heat sealable tea bags therefrom.

9. A fibrous web when produced by the method as claimed in any of claims 1 to 7.

10. Apparatus for manufacturing a fibrous web comprising a screen provided with means for restricting fluid drainage therethrough in accordance with a given pattern, which drainage restricting means does not extend substantially beyond the upper surface of the screen means for feeding a suspension of fibres in a fluid on to said screen, and means for removing a fibrous web produced thereby from the screen.

11. Apparatus as claimed in claim 10 in which the screen is a wire web and the drainage restricting means comprises discontinuous areas blanked-off to prevent drainage therethrough.

12. Apparatus as claimed in claim 11, in which the discontinuous areas are blanked-off by a coating of gelatin.

13. Apparatus as claimed in claim 10, in which the screen is in the form of a plain wire web, the drainage restricting means being formed by a second patterned screen located beneath the wire web.

14. A method of manufacturing a fibrous web substantially as hereinbefore described with reference to the accompanying drawings.

15. A fibrous web substantially as hereinbefore described with reference to Figure 3 or Figure 4 of the accompanying drawings.

16. Apparatus for manufacturing a fibrous web substantially as hereinbefore described with reference to Figures 1 and 2 or Figure 5 of the accompanying drawings.

MARKS & CLERK,
Chartered Patent Agents,
Agents for the Applicants.

Berwick-upon-Tweed: Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd.—1965
Published at The Patent Office, 25 Southampton Buildings, London, W.C.2 from which copies may be obtained.

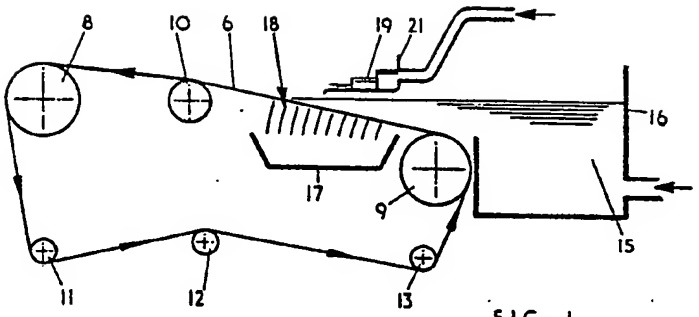


FIG. 1.

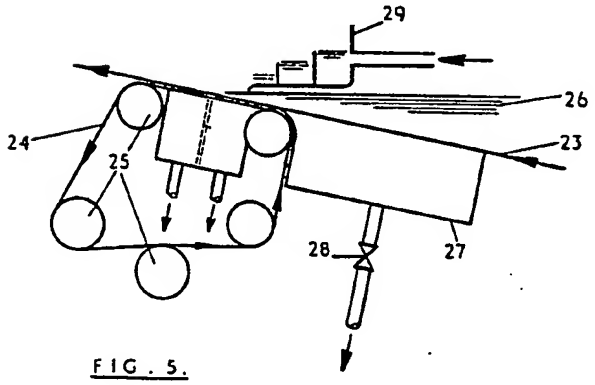


FIG. 5.

1000703 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheets 1 & 2

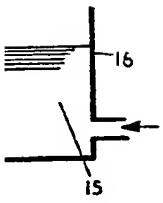


FIG. 1.

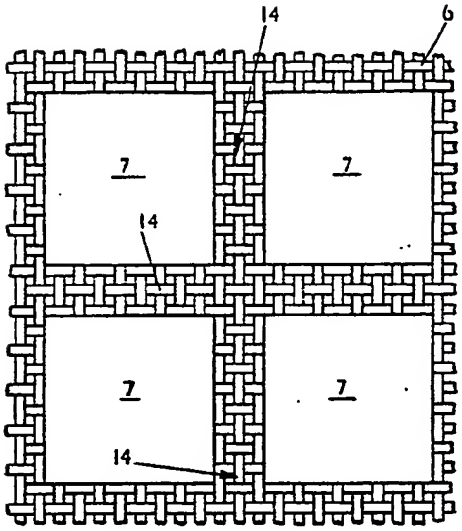


FIG. 2.

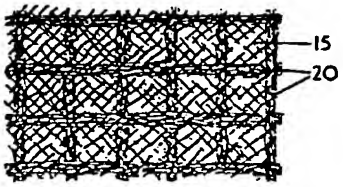
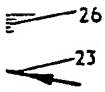


FIG. 3.



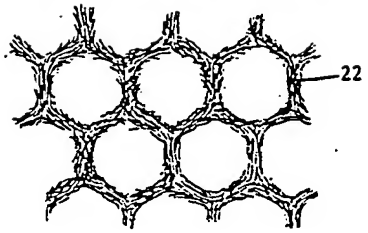


FIG. 4.

1000703 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheets 1 & 2

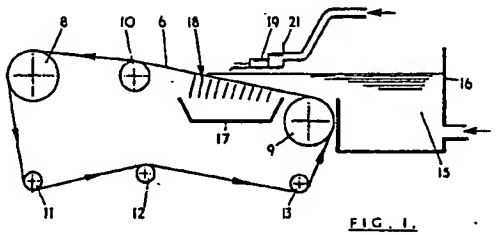


FIG. 1.

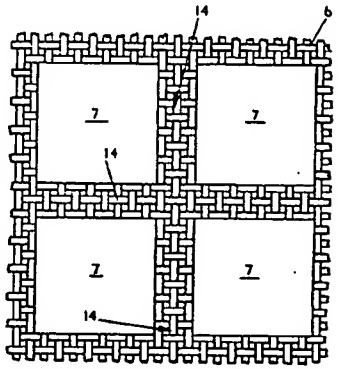


FIG. 2.

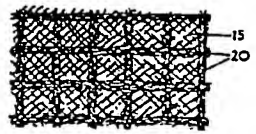


FIG. 3.

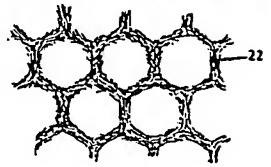


FIG. 4.

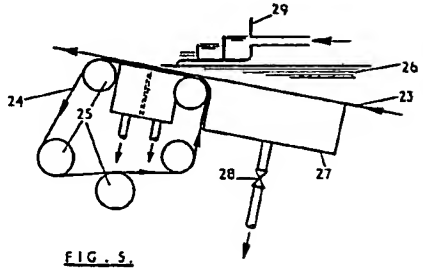


FIG. 5.